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(54) **Producing coloured decorative paper and decorative laminates therefrom.**

(57) A method is described for producing a coloured decor sheet by uniformly coating the uppermost surface of a fibrous cellulosic sheet with an aqueous or melamine-based slurry containing a colourant using a slot coater. A laminate employing such a decor sheet is also described.

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The present invention relates to a method for producing coloured paper for use in decorative laminates.

The preparation of coloured paper for use in laminates previously has involved adding the colourants or pigments to the pulp prior to forming the decorative paper. In the prior processes, adjustments in colour of the paper to obtain a colour match involve adding an amount of the desired materials to the batch of pulp, running a small amount of paper on the paper machine, and then stopping the machine while a laminate of the papers is prepared for comparison against a standard. If the colour is not right, additional pigments are added to the pulp and the procedure is repeated. The starting, stopping and comparison procedures generally take between 15 and 60 minutes per trial. Therefore, in order to obtain a satisfactory colour match, the paper machine may be non-operational for long periods of time. Such processes can be very unattractive economically, especially when small orders are involved. Thus, it would be desirable to find a method of achieving good colour match which may be produced consistently without the down time which is common in the previously known methods.

We have now found that decor sheets having a uniform colour coating and exhibiting excellent colour match can be produced by using a slot coater to apply a slurry, preferably an aqueous slurry, containing colourant directly on the surface of the finished paper. The slurry suitably also includes an opacifying agent and a binder.

Accordingly, the invention provides in a first aspect thereof a method for producing a coloured decor sheet for use in decorative laminates which comprises: applying colourant to the top surface of a fibrous cellulosic sheet, preferably bleached, said colourant being uniformly applied to said cellulosic sheet from a slurry containing said colourant using a slot coater; and drying said coloured decor sheet.

In a second and alternative aspect of this invention, we provide a coloured decor sheet for use in decorative laminates, said decor sheet comprising a fibrous cellulosic sheet and being characterised in having a uniform coating of colourant(s) on the top surface thereof.

The invention provides, according to a third alternative aspect thereof, a decorative laminate comprising: a plurality of fibrous cellulosic core sheets impregnated and bonded together with a thermosetting resin, and a decor sheet comprising a fibrous cellulosic sheet; and being characterised in that said decor sheet has a uniform coating thereon comprising one or more colourants. An abrasion-resistant overlay may be advantageously also employed.

In carrying out our method, a slurry containing one or more colourants is applied as a uniform coating on the uppermost surface of the sheet using a slot coater. The coated sheet can be saturated with a mel-

amine resin in a known manner similar to that previously used in preparing decorative sheets. Titanium dioxide may also be present in the slurry in major amounts as an opacifying agent to provide the desired opacifying or hiding effect.

We employ a slot coater to produce a uniformly coloured coating on the rough porous surface of papers for use as decor sheets in the preparation of decorative laminates. The uniformly coloured coating produced with the slot coater minimizes mottle which we have found is a major problem if other coating methods are attempted.

In addition to creating a very smooth and uniform coating, the slot coating method provides an easier and faster method for consistently reproducing the colour of the paper to obtain a superior colour match. By using a small family of colours for base papers, coatings of similar shades can be applied to the raw stock to create a large number of colours. The coating head colour system of the slot coater can be small so that any adjustments to colour are very quick and very precise, and once a colour match is achieved, it will not change due to any recycled material.

While we refer particularly to use of titanium dioxide as an opacifying agent, those skilled in the art will appreciate that equivalent opacifying pigments such as clay, amorphous silica, etc., may be used in place of, or in combination with, titanium dioxide. The amount of titanium dioxide and colourant can be adjusted to provide the desired colour and opacifying or hiding effect. The combined amount of titanium dioxide and colourant in the coating will be about 50 to 150% based on the fibrous decorative sheet.

The slurry we employ in practice of the present invention is preferably an aqueous based slurry containing the desired colourants, opacifying agents and binder. Although the aqueous slurry may be applied to the decor sheet on the paper making machine, it is generally advantageous to apply the slurry directly on to a dry decor sheet off the paper machine. The coated decor sheet is dried to provide a uniformly coated decor sheet having a consistent colour for use in decorative laminates.

The binder material may be any of the commonly used binders such as silica aerogel, fumed silica, microcrystalline cellulose, sodium alginate, melamine, etc., used in coating compositions where the coating material needs to be bonded to the substrate material. Melamine resins such as melamine-formaldehyde are advantageously used as the binder material since the melamine-formaldehyde resin is commonly used to saturate the substrate or decor sheet.

The slurry may also be a melamine-based slurry, in which case the melamine may be the same resin as that used to impregnate the decor sheet during its manufacture on the paper machine. As one might expect, it is not necessary for the decor sheet to be fully saturated with melamine or similar impregnating resin

where the slurry to be employed additional resin to fully saturate the decor sheet.

The core sheets of the laminate may be of any desired type, and core sheets such as those derived from wood, particle board, plaster board, asbestos board and the like are contemplated, as well as the commonly used plies of bleached or unbleached kraft paper which are impregnated with resins such as phenol-formaldehyde resins, etc. The number of core sheets making up a decorative laminate will depend upon the desired thickness of the laminate and the basis weight of the papers used. The laminate may range from 1/16 to 1/2 inch (0.15875 to 1.27cm) thick and preferably 1/12 to 1/5 inch (0.21167 to 0.508cm). In most instances, the laminate will contain approximately 5 to 8 core sheets. In other cases, however, where a particularly thick laminate is desired, the laminate may contain up to 40 core sheets. On the other hand, if a heavier basis weight paper is used, the laminate may be formed from as few as two or three core sheets. The core sheets useful in the present invention preferably have a basis weight of about 30 to 200 pounds per 3000 square feet and, most preferably, about 70 to 150 pounds per 3000 square feet.

Selection of the resin for impregnation of the core or decor sheets for multiple layer printed or unprinted decorative laminates will largely be governed by the intended end use of the finished laminate. Aminoplasts such as melamine-formaldehyde resins, acrylics such as polyacrylonitrile, polyester resins such as diallyl phthalate, phenolic resins, polyurethanes, and epoxy resins may be used. Such resins are widely used in the art.

The overlay sheet can be formed from fibres conventionally used for this purpose. One of the most common fibres is alpha cellulose or mixtures thereof with other cellulose fibres. Also useful is a highly bleached fibrous cellulosic pulp or alpha pulp beaten to a Canadian Standard Freeness of about 500 ML.

The cellulose fibres used in practise of the present invention are preferably a bleached Kraft pulp, although any fibre used in conventional decor sheets may be employed. The pulp may consist of hardwoods or softwoods or a mixture of hardwoods and softwoods. Higher alpha cellulose such as cotton may be added to enhance characteristics such as post-formability.

Additives such as alum, alkali and the like may be used to control end use characteristics such as post-forming. Wet strength resins may also be added for wet strength characteristics. A retention aid may be used if desired.

Furthermore, properties such as flame retardant characteristics and abrasion resistance can be introduced during or after the papermaking process using technology which is already available.

The basis weight of the decorative sheets may range from approximately 30 to 100 pounds per 3000

square feet and preferably ranges from approximately 45 to 75 pounds per 3000 square feet.

The decor sheet is impregnated with a laminating resin in an otherwise conventional manner. The sheets are preferably impregnated with commercially available melamine-formaldehyde or polyester resins and subsequently dried to a non-tacky but fusible state.

Various patterns may be printed or created on these decorative sheets. Most typically, a marble grain or wood grain pattern or portions of a marble pattern or wood grain pattern such as selected coloured streaks will be printed on the sheets. A typical print-containing laminate includes a number of core sheets and at least one decor sheet to which a predetermined colour has been slot coated on the surface thereof.

Claims

1. A method for producing a coloured decor sheet for use in decorative laminates which comprises: applying colourant to the top surface of a fibrous cellulosic sheet, preferably bleached, said colourant being uniformly applied to said cellulosic sheet from a slurry containing said colourant using a slot coater; and drying said coloured decor sheet.
2. A method according to Claim 1, wherein said slurry is an aqueous slurry.
3. A method according to Claims 1 or 2, wherein said slurry further contains an opacifying agent, preferably titanium dioxide.
4. A method according to any preceding claim, wherein said slurry further contains a resin, preferably a melamine resin.
5. A method according to any preceding claim, wherein said slurry is uniformly applied to said cellulosic sheet at a coat weight of about 10 to 40 pounds per 3000 square feet.
6. A method according to any preceding claim, wherein said slurry is uniformly applied to said cellulosic sheet using said slot coater off the paper making machine.
7. A method according to any preceding claim, wherein said fibrous cellulosic sheet includes hardwood and softwood fibres.
8. A coloured decor sheet for use in decorative laminates, said decor sheet comprising a fibrous cellulosic sheet and being characterised in having a

uniform coating of colourant(s) on the top surface thereof.

9. A decor sheet according to Claim 8, characterised in that said coating further contains an opacifying agent, preferably titanium dioxide. 5
10. A decor sheet according to Claims 8 or 9 characterised in that said coating further contains a resin, preferably a melamine resin. 10
11. A decor sheet according to any of Claims 8, 9 or 10, further characterised in that said fibrous cellulosic sheets contains hardwood and softwood fibres. 15
12. A decorative laminate comprising: a plurality of fibrous cellulosic core sheets impregnated and bonded together with a thermosetting resin, and a decor sheet comprising a fibrous cellulosic sheet; and being characterised in that said decor sheet has a uniform coating thereon comprising one or more colourants. 20
13. A decorative laminate according to Claim 12, further characterised in that said decor sheet comprises a decor sheet according to any of Claims 9, 10 or 11. 25

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EUROPEAN SEARCH REPORT

Application Number

EP 93 30 1424

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	FR-A-1 407 897 (CIBA SOCIETE ANONYME)	8-13	D21H27/26
Y	* abstract *	1-7	B44C5/04
	---		B32B27/04
Y	FR-A-2 219 992 (SVENSKA CELLULOSA AKTIEBOLAGET)	1-7	
	* page 19, line 13 - page 21, line 27; claim 1 *		

			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			D21H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 18 MAY 1993	Examiner SONGY Odile
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>I : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons</p> <p>& : member of the same patent family, corresponding document</p>			

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